

Correlation of Affective Disorder with BMI in Reproductive and Menopausal Age Women

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ABSTRACT

OBJECTIVE: To correlate affective disorder with the body mass index (BMI) in reproductive and menopausal age women.

STUDY DESIGN: Cross-sectional study.

SETTING: Consultant Psychiatric Clinic

DURATION: From 1st March 2012 to 30th November 2014.

METHOD: Women visiting the psychiatric Consultation Clinic were grouped as reproductive and menopausal aged group in relation to their diagnosis as depressed or bipolar affective disorders as per ICD-10 criteria. Their BMI calculated by weight in kilograms divided by the square of the height in meters square (kg/m^2)

RESULTS: Total 224 consecutive women with prior written and oral consent were included in this study. It was found that menopausal women had greater BMI values as compared to the women in reproductive age. Similarly in the subcategories of BMI classified as underweight, normal, overweight and obese, the menopausal group significantly correlated with BMI having higher values. The BMI did not correlate with the occurrence of affective disorders, be it depression or bipolar disorder, even in the subcategories.

CONCLUSION: Thus, it can be concluded that owing to the biochemical and neurochemical impact, BMI may affect the mental status of women. Further on present results can be helpful in the treatment of affective disorder patients, emphasizing on nutrition and exercise.

KEY WORDS: BMI, Depression, Bipolar disorder, Reproductive and Menopausal age women.

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INTRODUCTION

Mood disorders, also known as Affective disorder, are the most common psychiatric illnesses in the present era with marked differences by age group such that the prevalence in 18 to 29 year-old individuals is three fold higher than the prevalence in individuals aged 60 years or older. Females experience 1.5 to 3 fold higher rates than males.¹ These disorders can be broadly described as emotional disorder but does not spare cognitive and psychomotor dysfunction leading to impaired functionality.² Mood disorders include major depressive disorders, bipolar disorders and their respective attenuated variants known as dysthymic disorders, cyclothymic disorders and disruptive mood disorder.³ Multiple social and biological factors may be involved in the etiology of such disorders. Social factors may include rejection, failure and defeat of any kind while biological factors are many including genes, physique, neurotransmitters, hormones etc. An association with birth weight, height, and body mass index has been examined.⁴

Depression is a mental disease that affects complex cognitive and emotional functions. It is believed that

depression is twice as prevalent in women as in men.⁵ It is a common but serious condition that can have a devastating effect on patients' lives with somatic and psychic presentations.⁶ Owing to the fact that females are exposed to the greatest levels of hormonal fluctuations throughout life, women are more prone to mood disorders. The hormonal aspect has been studied to great extent by various studies such as, women during reproductive age show major variations in estrogen levels throughout their monthly menstrual cycles. Estradiol with its effects on follicle stimulating hormone (FSH) and reutilizing hormone (LH), complemented by rising progesterone, results in mid-cycle surge of LH necessary for ovulation.⁷ It was revealed in a study that low levels of LH were found in depressed as compared to normal postmenopausal women.⁸ Ernest Kretschmer in the 1930's classified personalities and the mental disorders they may suffer according to physique whereas William Sheldon in the 1940's correlated temperament and body type. This highlights that psychologists have since a very long time observed the influence of physique and body type on behaviour.^{9,10} Estrogen levels are diminished in postmenopausal period in relation to progress in

age and so are the functions it performs, though it is put forth through studies that the synthesis and release of estrogen is related to Body Mass Index (BMI).¹¹ Estrogen causes mobilization of fat by inhibiting lipoprotein lipase (LPL) activity and increasing epinephrine access to the adipose tissues causing vasodilatation enhancing hormone sensitive lipase (HSL) activity.¹² Estrogen also stimulates growth hormone (GH) activity that causes mobilization of free fatty acids from the adipose tissues.¹³

Since most of the research has focused on biochemical and hormonal aspects of mood disorder and other biological factors such as physique and there is dearth of research in this area in our population, this study was planned to investigate the association of affective disorder in relation to BMI in women of reproductive and menopausal age group.

MATERIAL & METHODS

This cross-sectional study was carried out at the Psychiatry Consultation Clinic at Karachi from 1st March 2012 to 30th November 2014. All 224 consecutive women with prior written and oral consent were included, on a condition that their personal details shall be kept confidential. The study complies with all standards of the Ethical Review Board Jinnah Postgraduate Medical Centre, Karachi and has been approved by the board. The inclusion criteria were consenting

cases above 20 years and below 65 years of age. Excluding criteria for cases were below 20 years, pregnant women on current psychotropic medication hormonal replacement therapy. All subjects of the study were free from medication and any other medical condition. The categorization as reproductive and menopausal age women was between 22-40 and 40-65 years respectively. The diagnosis was made as per ICD-10 criteria for affective disorder currently Bipolar and Depressed. The two most common and relevant categories of mood spectrum disorder is depressive disorder and bipolar disorder was correlated with BMI that was calculated as per standard procedure (weight in kg/height in meter²). Independent sample t-test (SPSS version 21) is used to calculate the significance of the results.

RESULTS

Total 224 consecutive women with prior written and oral consent were included in this study. Among them 138 (61.6%) were in the reproductive age while 86 (38.4%) were in their menopausal age women.

The mean difference of BMI (Kg/m²) between menopause groups is significant, with a t-value -2.684 (P=0.008). For detail please see Table I.

Table II shows the mean difference of BMI (Kg/m²) between affective disorders is insignificant.

Table III depicts the mean difference of BMI (Kg/m²)

TABLE I: MEAN DIFFERENCE OF BMI (Kg/m²) BETWEEN REPRODUCTIVE AND MENOPAUSAL GROUPS (n=224)

Status	Mean ±SD	Mean Difference	t	df	p-value
Reproductive age women (n=138)	25.04±6.27	-2.266	-2.684	222	0.008*
Menopausal (n=86)	27.30±5.94				

P-value ≤0.05 considered as significant

TABLE II: MEAN DIFFERENCE OF BMI (Kg/m²) BETWEEN AFFECTIVE DISORDERS (n=224)

Disease	Mean ±SD	Mean Difference	t	df	p-value
F31 (n=20)	25.90±6.25	-0.007	-0.005	222	0.996**
F32 (n=204)	25.91±6.24				

P-value ≤0.05 considered as significant. F 31=Bipolar disorder, F32=Depression

TABLE III: MEAN DIFFERENCE OF BMI (Kg/m²) BETWEEN AFFECTIVE DISORDERS ACCORDING TO REPRODUCTIVE AND MENOPAUSAL GROUP (n=224)

Status	Disease	Mean ±SD	Mean Difference	t	df	p-value
Reproductive age women	F31 (n=9)	24.55±5.45	-0.523	-0.241	136	0.810**
	F32 (n=129)	25.07±6.34				
Menopausal age women	F31 (n=11)	27.01±6.88	-0.340	-0.177	84	0.860**
	F32 (n=75)	27.35±5.84				

P-value ≤0.05 considered as significant. F 31=Bipolar disorder, F32=Depression

TABLE IV: MEAN DIFFERENCE OF BMI (Kg/m²) BETWEEN AFFECTIVE DISORDERS GROUPS ACCORDING TO BMI SUB-CATEGORIES.

		Mean ±SD	Mean Difference	t	df	p-value
<18.5 Kg/m ²	F31(n=2)	15.85±1.68	-0.640	-0.602	19	0.555**
	F32(n=19)	16.49±1.41				
18.5 - 24.9 Kg/m ²	F31(n=5)	21.15±1.72	-0.324	-0.350	74	0.728**
	F32(n=71)	21.48±2.02				
25.0 – 29.9 Kg/m ²	F31(n=9)	26.76±1.61	-0.565	-1.045	77	0.299**
	F32(n=70)	27.33±1.51				
>30.0 Kg/m ²	F31(n=4)	34.93±4.45	0.055	0.027	46	0.979**
	F32(n=44)	34.88±3.96				

P-value ≤0.05 considered as significant. F 31=Bipolar disorder, F32=Depression

TABLE V: MEAN DIFFERENCE OF BMI (Kg/m²) BETWEEN REPRODUCTIVE AND MENOPAUSAL GROUPS ACCORDING TO BMI GROUPS

		Mean ±SD	Mean Difference	t	df	p-value
< 18.5 Kg/m ²	Reproductive age (n=17)	16.46±1.34	0.208	0.261	19	0.797**
	Post menopause (n=7)	16.26±1.88				
18.5 – 24.9 Kg/m ²	Reproductive age (n=51)	21.01±1.96	-1.342	-2.887	74	0.005*
	Post menopause (n=25)	22.36±1.78				
25.0 – 29.9 Kg/m ²	Reproductive age (n=43)	27.25±1.65	-0.026	-0.078	77	0.938**
	Post menopause (n=36)	27.28±1.38				
> 30.0 Kg/m ²	Reproductive age (n=27)	34.52±3.61	-0.833	-0.721	46	0.475**
	Post menopause (n=21)	36.35±4.39				

P-value ≤0.05 considered as significant.

between affective disorders is insignificant according to menopause status is insignificant.

Table IV: The mean difference of BMI between affective disorders according to BMI groups also showed insignificant results in all BMI sub-categories.

Table V: The mean difference of BMI between menopause groups according to BMI groups showed insignificant results in all BMI groups except 18.5-24.9 Kg/m².

DISCUSSION

Disorders of emotion, affect or mood that are common in females has direct link with the physique and biochemistry of body. This study is based on BMI, one of the parameter of physique, with relation to mood disorders among women of reproductive and menopausal age group. This study revealed that BMI is strongly associated with the menopausal status of women. As depicted in Table I, Post-menopausal

women presented a higher BMI as compared to the women in reproductive age. This can be explained on biochemical aspect, as it has been shown that estradiol levels decreased with higher BMI in premenopausal and early peri-menopausal women, but in late peri-menopausal and postmenopausal women, the levels increased with higher BMI.¹⁴ A positive association between estradiol levels and stored fat during the menstrual cycle has been reported by Ziolkiewicz and coworkers.¹⁵ Ley and colleagues¹⁶ observed greater fat mass in menopausal women as compared to reproductive age women. These observations suggest that fat stores and a higher BMI have a positive effect on estradiol synthesis. This could obviously correlate to the nutritional status of women, well-nourished women expressing fecundity better as compared to the undernourished. Similarly, women already crossed their reproductive age may also synthesize estradiol and benefit from its value relative to their

BMI. Results of the present study showed a higher mean BMI value for post-menopausal women suggestive of a not only physically but even mentally healthy group, owing to its effects on the serotonergic system too. Since estrogen stimulates a significant increase in the density of 5HT 2A receptors in anterior frontal, cingulate and primary olfactory cortex and in the nucleus accumbens, the areas of the brain concerned with the control of mood, mental state, cognition, emotion and behaviour, well maintained levels of estrogen are promising for mental wellbeing.¹⁷

According to the results of the present study no significant difference of BMI between affective disorders was observed (Table II). The affective disorder, be it bipolar or depression had no association with BMI nor did the reproductive age status correlate (Table III). In addition, the mean difference of BMI (kg/m^2) between affective disorders groups according to subcategories of BMI i.e. underweight, normal, overweight and obese showed no significance (Table IV). Moreover, the postmenopausal women in the normal BMI group ($18.5\text{-}24.9 \text{ Kg/m}^2$) have a significantly higher BMI as compared to women of reproductive age (Table V). This signifies that factors other than BMI regulate the mental status of women in this population. According to a study, Vitamin D is essential for estrogen biosynthesis, mainly due to its effect on calcium regulation and also may have an effect on the aromatase gene.¹⁸ On the other hand estrogen has numerous effects on the metabolism of the body. Estrogens are known to influence glucose homeostasis with dominant effects in the liver and regulate various enzymes of the Tri Carboxylic Acid cycle and β oxidation too.¹⁹

Interestingly, BMI is not a complete representation of fat storage and energy balance; hence it may not be justified to explain the prevalence of affective disorders exclusively on the basis of BMI. It is highly essential that the estrogen levels, lipid profile and cortisol levels of these women be determined to be related with the prevailing psychiatric disorders in them.

CONCLUSION

The BMI of postmenopausal age group women was found to be significant and there was no significant difference in depressive and bipolar affective disorders. On the other hand the BMI of postmenopausal cases classified as normal according to BMI showed comparatively higher values with respect to women of reproductive age group. These findings may be helpful during treatment strategies focusing on the nutrition and physical activities to restore normal BMI that will have a good impact on the emotional wellbeing.

Limitations of the Study

Due to lack of facilities / financial and time constraints following are the limitations of the study. Since this is

hospital clinic based study so may not be true representative of the community/population. Full diagnostic spectrum of affective (mood) disorders such as dysthymia, cyclothymia disruptive mood regulation disorder were not addressed. The international criteria of BMI were followed instead of specified for Asian population because of the diversity of Asian population. Use of weight altering medication and biochemical aspects may be the confounding factors.

Recommendation

It is recommended that community based study comprising of large representative sample addressing the above mentioned limitation may be carried out in future.

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